

APPENDIX B

CORRECTIVE MEASURES STUDY AND IMPLEMENTATION

TASK I: DEVELOPMENT OF CORRECTIVE ACTION ALTERNATIVES(S)

Based on the results of the RCRA Facility Investigation, the Permittee shall identify, screen and develop the alternative or alternatives for removal, containment, treatment and/or other remediation of the contamination based on the objectives established for the corrective action.

A. Description of Current Situation

The Permittee shall submit an update to the information describing the current situation at the facility and the known nature and extent of the contamination as documented by the RCRA Facility Investigation I Report. The Permittee shall provide and update to the information presented in the Task I Report to the Executive Secretary regarding previous response activities and any interim measures which may have or are being implemented at the Facility. The permittee shall also made a Facility-specific statement of the purpose for the response, based on the results of the RCRA Facility Investigation. The statement of purpose shall identify the actual or potential exposure pathways that should be addressed by corrective measures.

B. Establishment of Corrective Action Objectives

The Permittee shall establish site-specific objectives for the corrective action. These objectives shall be based on public health and environmental criteria, information gathered during the RCRA Facility Investigation, EPA guidance, and the requirements of any applicable State and federal statutes. At a minimum, all corrective actions concerning groundwater releases from regulated units must be consistent with, and as stringent as, those required under R450-8-6.11 and R450-101.

C. Screening or Corrective Measure Technologies

The Permittee shall review the results of the RCRA Facility Investigation to identify technologies with are appropriate for the Facility. The Permittee shall screen technologies to eliminate those which have severe limitations for a given set of waste and site-specific conditions. The screening may eliminate technologies based on inherent technology limitations.

Site, waste, and technology characteristics which are used to screen inapplicable technologies are described in more detail below:

1. Site Characteristics

Site data shall be reviewed to identify conditions that may limit or promote the use of certain technologies. Technologies whose use is clearly precluded by site characteristics shall be eliminated from further consideration.

2. Waste Characteristics

Identification of waste characteristics that limit the effectiveness or feasibility of technologies is an important part of the screening process. Technologies clearly limited by these waste characteristics shall be eliminated from consideration. Waste characteristics particularly affect the feasibility of in-situ methods, direct treatment methods, and land disposal (on/off-site).

3. Technology Limitations

During the screening process, the level of technology development, performance record, and inherent construction, operation, and maintenance problems shall be identified for each technology considered. Technologies that are unreliable, perform poorly, or are not fully demonstrated may be eliminated in the screening process. For example, certain treatment methods have been developed to a point where they can be implemented in the field without extensive technology transfer or development.

D. Identification of Corrective Measure Alternatives

The Permittee shall develop the corrective measure alternatives based on the corrective action objectives. The Permittee shall rely on engineering practice to determine which technologies appear most suitable for the site. Technologies can be combined to form the overall corrective action alternative or alternatives. The alternative developed should represent a workable number of options(s) that each appear to adequately address all site problems and corrective action objectives. Each alternative may consist of an individual technology or a combination of technologies. The Permittee shall document the reasons for excluding any technologies.

TASK II: EVALUATION OF THE CORRECTIVE MEASURE ALTERNATIVES

The Permittee shall describe each corrective measure alternative that passes the screening in Task I and evaluate each corrective measure alternative and its components. The evaluation shall be based on technical, environmental, human health and institutional concerns. The Permittee shall also develop cost estimates of each corrective measure.

A. Technical/Environmental/Human Health/Institutional

For each corrective measure alternative, the permittee shall provide a description which includes but is not limited to the following: preliminary process flow sheets, preliminary sizing and type of construction for buildings and structures, and rough quantities of

utilities required. The Permittee shall evaluate each alternative in four areas.

1. Technical - The Permittee shall evaluate each corrective measure alternative based on performance, reliability, implementation, and safety.
 - a. The Permittee shall evaluate performance based on the effectiveness and useful life of the corrective measure:
 - i) Effectiveness shall be evaluated in terms of the ability to perform intended functions, such as containment, diversion, removal, destruction, or treatment. The effectiveness of each corrective measure shall be determined either through design specifications or by performance evaluation. Any specific waste or site characteristics which could potentially impede effectiveness shall be considered. The evaluation shall also consider the effectiveness of combinations of technologies; and
 - ii) Useful life is defined as the length of time the level of effectiveness can be maintained. Most corrective measure technologies with the exception of destruction, deteriorate with time. Deterioration can often be slowed through proper system operation and maintenance, but the technology may eventually require replacement. Each corrective measure shall be evaluated in terms of the projected service lives of its component technologies. Resource availability in the future life of the technology, as well as appropriateness estimating the useful life of the project.
 - b. The Permittee shall provide information on the reliability of each corrective measure including its operations and maintenance requirements and its demonstrated reliability:
 - i) Operations and maintenance requirements include the frequency and complexity of necessary operation and maintenance. Technologies requiring frequent or complex operation and maintenance activities shall be regarded as less reliable than technologies requiring little or straightforward operation and maintenance. The availability of labor and materials to meet these requirements shall also be considered; and
 - ii) Demonstrated and expected reliability measures are ways measuring the risk and effect of failure. The Permittee shall evaluate whether the technologies have been used effectively under analogous conditions; whether the combination of technologies have been used together effectively; whether failure

of any one technology has an immediate impact on receptors; and whether the corrective measure has the flexibility to deal with uncontrollable changes at the site.

- c. The Permittee shall describe the implementation of each corrective measure including the relative ease of installation (construction) and the time required to achieve a given level of response:
 - i) Constructible is determined by conditions both internal and external to the Facility conditions and includes such items as location of underground utilities, depth of water table, heterogeneity of subsurface materials, and location of the Facility (i.e., remote location versus a congested urban area). The Permittee shall evaluate what measures can be taken to facilitate construction under these conditions. External factors which affect implementation include the need for special permits or agreements, equipment availability, and the location of suitable off-site treatment or disposal facilities; and
 - ii) The Permittee shall address the time it takes to implement a corrective measure and the time it takes to actually see beneficial results. Beneficial results are defined as the reduction of contaminants to some acceptable, pre-established level.
- d. The Permittee shall evaluate each corrective measure alternative with regard to safety. The evaluation shall include threats to the safety of nearby communities and environments as well as those to workers during implementation. Factors to consider are fire, explosion, and exposure to hazardous substances.

2. Environmental

The Permittee shall perform an Environmental Assessment for each alternative. The Environmental Assessment shall focus on the Facility conditions and pathways of contamination addressed by each alternative. The Environmental Assessment for each alternative will include, at a minimum, an evaluation of: the short- and long-term beneficial and adverse effects of the response alternative; any adverse effects on environmentally sensitive areas; and an analysis of measures to mitigate adverse effects.

3. Human Health

The Permittee shall assess each alternative in terms of the extent to which it

mitigates short- and long-term potential exposure to any residual contamination and protects human health both during and after implementing the corrective measures. The assessment will describe the types and levels of contaminants on-site, potential exposure routes, and potentially affected populations. Each alternative will be evaluated to determine the level of exposure to contaminants and the reduction over time. For management of mitigation measures, the relative reduction of impact will be determined by comparing residual levels of each alternative with existing criteria, standards, or guidelines acceptable to the Executive Secretary.

4. Institutional

The Permittee shall assess the effects of federal, state and local environmental and public health standards, regulations, guidance, advisories, ordinances, or community relations on the design, operations, and timing of each alternative.

B. Cost Estimate

The Permittee shall develop an estimate of the cost of each corrective measure alternative (and for each phase of segment of the alternative). The cost estimate shall include both capital and operation and maintenance costs.

a. Direct capital costs include:

1. Capital costs consist of direct (construction) and indirect (non-direct), and equipment required to install the corrective measure.

- i) Construction costs: Cost of materials, labor (including fringe benefits and worker's compensation), and equipment required to install the corrective measure.
- ii) Equipment costs: Costs of treatment, containment, disposal and/or service equipment necessary to implement the action; these materials remain until the corrective action is complete;
- iii) Land and site-development costs: Expenses associated with purchase of land and development of existing property; and
- iv) Buildings and services costs: Costs of process and non-process buildings, utility connections, purchased services, and disposal costs.

b. Indirect capital costs include:

- i) Engineering expenses: Costs of administration, design,

- construction supervision, drafting, and testing of corrective measure alternatives;
- ii) Legal fees and license or permit costs: Administrative and technical costs necessary to obtain licenses and permits for installation and operation;
 - iii) Start-up and shakedown costs: Costs incurred during corrective measure start-up; and
 - iv) Contingency allowances: Funds to cover costs resulting from unforeseen circumstances, such as adverse weather conditions, strikes, and inadequate Facility characterization.
2. Operation and maintenance costs are post-construction costs necessary to ensure continued effectiveness of a corrective measure. The Permittee shall consider the following operation and maintenance cost components;
- a. Operating labor costs: Wages, salaries, training, overhead, and fringe benefits associated with the labor needed for post-construction operations;
 - b. Maintenance materials and labor costs: Cost for labor, parts, and other resources required for routine maintenance of facilities and equipment;
 - c. Auxiliary materials and energy: Costs of such items as chemicals and electricity for treatment plant operations, water and sewer service, and fuel;
 - d. Purchased services: Sampling costs, laboratory fees, and professional fees for which the need can be predicted;
 - e. Disposal and treatment costs: Costs of transporting, treating, and disposing of waste materials, such as treatment plant residues, generated during operations;
 - f. Administrative costs: Costs associated with administration of corrective measure operation and maintenance not included under other categories;
 - g. Other costs: Items that do not fit any of the above categories.

TASK III. RECOMMENDATION OF A CORRECTIVE MEASURE OR MEASURES

The Permittee shall justify and recommend a corrective measure alternative using technical, human health,

and environmental criteria. The Permittee shall submit summary tables of the corrective measure alternative recommendations. Tradeoffs among health risks, environmental effects, and other pertinent factors shall be highlighted. The executive Secretary shall approve the corrective measure alternative or alternatives to be implemented based on the results of Tasks II and III. The following criteria will be used to select the final corrective measure or measures.

A. Technical

1. Performance - corrective measure or measures which are most effective at performing their intended functions and maintaining performance over extended periods of time;
2. Reliability - corrective measure or measures which do not require frequent or complex operation and maintenance activities and that have proven effective under waste and Facility conditions similar to those anticipated;
3. Implementation - corrective measure or measures which can be constructed and operating to reduce levels of contamination to attain or exceed applicable standards in the shortest period of time; and
4. Safety - corrective measure or measures which pose the least threat to the safety of nearby residents and environments as well as workers during implementation.

B. Human Health

The corrective measure or measures must comply with existing federal and state criteria, standards, or guidelines for the protection of human health. Corrective measures which provide the minimum level or exposure to contaminants and the maximum reduction in exposure with time are preferred.

C. Environmental

The corrective measure or measures posing the least adverse impact (or greatest improvement) over the shortest period of time on the environment will be favored. The corrective measure(s) will be assessed as to the degree to which it employs treatment that reduces toxicity, mobility or volume of hazardous wastes and/or hazardous waste constituent(s).

TASK IV. CORRECTIVE MEASURES(S) IMPLEMENTATION

The purpose of the Corrective Measure Implementation program to design, construct, operate, maintain, and monitor the performance of the corrective measure or measures selected to protect human health and the environment.

A. Corrective Measure Implementation Program Plan

The Permittee shall prepare a Corrective Measure Implementation Program Plan. This program will include the development and implementation of several plans, which require concurrent preparation. It may be necessary to revise plans as the work is performed to focus efforts on a particular problem. The Permittee shall furnish all personnel, materials and services necessary for the implementation of the corrective measure(s).

1. The Permittee shall prepare a Program Management Plan which will document the overall management strategy for performing the design, construction, operation, maintenance and monitoring or corrective measure(s). The plan shall document the responsibility and authority of all organizations and key personnel involved with the implementation. The Program Management Plan will also include a description of qualifications of key personnel directing the Corrective Measures Implementation program, including contract personnel.
2. The Permittee shall revise the Community Relations Plan, performed as part of the RCRA Facility Investigation workplan, to incorporate any changes addressing the community during the design and construction activities.

B. Corrective Measure(s) Design

The Permittee shall prepare final construction plans and specifications to implement the corrective measure(s) at the Facility as defined in the Corrective Measure Study. At a minimum, the following shall be included, but not be limited to:

1. Design strategy and basis.
 - a. Design strategy and basis.
 - b. Currently accepted environmental control measures, construction practices and techniques, and the constructibility of the design.
 - c. Assumptions, detailed drawings (e.g., process flow diagrams, general arrangement, and any applicable piping and instrumentation diagrams), equipment and specifications, and material and energy balances (if applicable).
 - d. Discussion of the possible sources of error and potential operation and maintenance problems.
2. Operations and maintenance plan:
 - a. Normal and alternate operation and maintenance practices (e.g., tasks for operation, tasks for maintenance, prescribed treatment or operation conditions, and schedule identifying frequency).

- b. Routine monitoring and laboratory testing (e.g., description of monitoring tasks, required laboratory tests and their interpretation, required Quality Assurance/Quality Control, and a schedule of monitoring frequency).
 - c. Equipment description (including equipment identification, installation, of monitoring components, maintenance procedures, and replacement schedule), and records and reporting (e.g., daily operating logs, laboratory records, records for operating costs, reporting emergencies, personnel and maintenance records, and required monthly and annual reports to be submitted to the Executive Secretary).
 - d. Alternate operating and maintenance procedures to prevent undue hazard due to system failure and analysis should a failure occur.
 - e. Safety plan during routine operation and safety tasks in the event of systems failure.
- 3. Cost estimate.
- 4. Project schedule (identifying timing for initiation and completion of all critical path tasks, dates, for completion of the project and major milestones).
- 5. Construction quality assurance objectives (including but not limited to the responsibility and authority, personnel qualifications, inspection activities, sampling requirements, and documentation).
- 6. Health and safety plan (the health and safety plan developed for the RCRA Facility Investigation shall be modified to address the activities to be performed to implement the corrective measure(s)).
- 7. Design phases:
 - a. Preliminary design, approximately 30% design completion. The permittee shall have filed verified the existing condition of the Facility. The technical design requirements of the project shall be at an adequate level of completion to enable a determination if the final design will provide an operable and usable corrective measure. Supporting data and documentation shall be provided with the design documents defining the functional aspects of the program. The Permittee shall include with the preliminary submission design calculations reflecting the same percentage of completion as the designs they support.
 - b. Intermediate design, approximately 60% completion. The intermediate design shall include the Design Plans and Specifications, Operation and Maintenance Plan, Project Schedule, quality Assurance Plan and

Specifications for the Health and Safety Plan.

- c. Equipment start-up and operator training identifying the contractor requirements for providing appropriate service visits by experienced personnel to supervise the installation, adjustment, start-up and operation treatment systems, and training covering appropriate operational procedures once the start-up has been successfully accomplished.
- d. Additional studies to supplement the available technical corrective measure implementation data may be required. Upon written notification from the Executive Secretary, the Permittee shall provide sufficient sampling, testing and analysis to optimize the required treatment and/or disposal operations and systems. A final report of the testing shall include all data taken during the testing and a summary of the results of the studies.
- e. Submittal of the pre-final design, approximately 95% completion. The pre-final design submittal shall include the Design Plans and Specifications, Operations and Maintenance Plan, Project Schedule, Quality Assurance Plan and Specifications for the Health and Safety Plan.
- f. Submittal of final design, approximately 100% completion. The final design submittal shall include the Final Design Plans and Specifications, the Final Operation and Maintenance Plan, Final Quality Assurance Plan, Final Project Schedule and Final Health and Safety Plan specifications.

C. Corrective Measure(s) Construction

Following the Executive Secretary approval of the final design, the Permittee shall develop and implement a construction quality assurance program to ensure, with a reasonable degree of certainty, that a completed corrective measure(s) meets or exceeds all design criteria, plans, and specifications. The construction quality assurance plan is a Facility-specific document which must be submitted to the Agency for approval prior to the start of construction. At a minimum, the construction quality assurance plan shall include the elements, which are summarized below. Upon the Executive Secretary approval of the construction quality assurance plan, the Permittee shall construct and implement the corrective measures in accordance with the approved design, schedule, and the construction quality assurance plan. The Permittee shall also implement the elements or the approved operation and maintenance plan.

- 1. The responsibility and authority of all organizations and the qualifications of all personnel shall be described in the construction quality assurance plan.
- 2. The observations and tests that will be used to monitor the construction and/or

installation of the components of the corrective measure(s) shall be summarized in the construction assurance plan. The plan shall include the scope and frequency of each type of inspection. Inspections shall verify compliance with all environmental requirements and include, but not be limited to, air quality and emissions monitoring records, waste disposal records, etc. The inspections shall also ensure compliance with all health and safety procedures.

- a. A preconstruction inspection and meeting shall be held to discuss methods for documenting and reporting inspection data, reviewing the distribution and storage of documents and reports, reviewing work area safety, discussing appropriate modifications to the construction quality assurance plan, and conducting a site visit.
- b. Upon preliminary project completion, the Permittee shall notify the Executive Secretary for the purposes of conducting a pre-final inspection of the entire site. The walk-through inspection is to determine whether the project is complete and consistent with the contract documents and the corrective measures as approved by the Executive Secretary. The Permittee shall certify that the equipment has performed to meet the purpose and intent of the specifications. Retesting shall be completed where deficiencies are revealed. This pre-final inspection report shall outline the outstanding construction items, actions required to resolve items, completion date(s) for these items, and the date of the final inspection.
- c. Upon completion of all outstanding construction items, the Permittee shall notify the Executive Secretary, by certified mail, express mail, or hand delivery, for the purposes of conducting a final inspection, the final inspection will focus on confirming that outstanding items have been resolved.

D. Sampling Requirements

The sampling activities, sample size, sample locations, frequency of testing, acceptance and rejection criteria, and plans for correcting problems shall be presented in the construction quality assurance plan.

E. Documentation

Reporting requirements for construction quality assurance activities shall be described in detail in the construction quality assurance plan. This shall include such items as daily summary reports, inspection and corrective measure reports, and design acceptance reports.

TASK V. REPORTS

A. Corrective Measures Study Reports

The Permittee shall prepare Corrective Measures Study reports in accordance with the schedule specified in Tables 19 and 20 of this permit.

B. Process Reports

The progress reports shall contain the following information, at a minimum:

1. A description and estimate of the percentage of the Corrective Measures Study completed;
2. Summaries of all findings;
3. Summaries of all changes made in the Corrective measures Study during the reporting period;
4. Summaries of all contacts with representative of the local community, public interest groups or State government during the reporting period;
5. Summaries of all problems or potential problems encountered during the reporting period;
6. Actions being taken to rectify problems;
7. Changes in personnel during reporting period;
8. Projected work for the next reporting period; and
9. Copies of daily reports, inspection reports, laboratory/monitoring data, etc.

C. Corrective Measure Construction Reports

1. At the completion of construction, the Permittee shall submit a Corrective Measure Construction report to the Executive Secretary. The report shall establish that the project was built according to the specifications and that the corrective measure is performing adequately. The report shall include, but not limited to, the following elements:
 - a. Certification of the design and construction;
 - b. Explanation of any modifications to the plans and why these were necessary;

- c. Listing of the criteria established for judging the functioning of the corrective measure and also explaining any modification to these criteria;
- d. Results of Facility monitoring, indicating that the corrective measure will meet or exceed the performance criteria; and
- e. Explanation of the operation and maintenance (including monitoring) to be undertaken at the Facility.

This report shall include all of the daily inspection summary reports, inspection summary reports, inspection data sheets, problem identification and corrective measure reports, block evaluation reports, photographic reporting data sheets, design engineers' acceptance reports, deviations from design and material specifications and as-built drawings.